Behavioral Spillover Across Health and Environmental Domains

Thesis

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Abstract

Existing research on behavioral spillover reveals that an intervention targeting one behavior has the potential to increase or decrease the motivation to engage in other related behaviors. Given the focus of prior spillover research is largely within one domain (e.g., environmental behaviors), it is not known if behavioral spillover occurs between health behaviors and environmental behaviors. Our research focuses on documenting positive spillover *between* these two domains, - which will open up an opportunity to promote environmental behaviors through health-based interventions (or vice versa). In an attempt to mend this gap in existing behavioral research, a Qualtrics survey has been developed and administered to Ohio State Undergraduate students to study the relationship between environmental and health behaviors and the existence of shared motivations that may lead to positive spillover. Specifically, we proposed that positive spillover between the two behavioral domains would occur for easy behaviors when the individual has strong and positive attitudes toward both the environment and personal health behaviors. Data collection and analysis presented correlations between these domains but not in a Mediation, Moderator model used to interpret causal pathways. This research has significant implications for society at large because individual health frames resonate for most people as a reason to act to address environmental issues. If we can document ways to establish positive spillover between health and environmental behaviors, this would help us understand how to better promote change in the environmental domain. Specifically, we could then increase pro-environmental behaviors by promoting healthy behaviors more generally, increasing- positive, collective environmental outcomes in addition to personal health outcomes.

Acknowledgements

I would like to thank my advisors, Dr. Robyn S. Wilson and Dr. Mary E. Wewers, for the time, effort, and guidance they provided throughout the research process and writing of this thesis. I am grateful to Emily Walpole and Hugh Walpole for their assistance and support.

Fields of Study

Major Field: Political Science

Minor Field(s): Society and Environmental Issues and Film Studies

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Introduction

Existing literature has distinguished behavioral spillover as "the effects of an intervention on subsequent behaviors not directly targeted by it" (Truelove et al, 2015, p. 127) and while knowledge on the subject is limited; the concept has been studied across various subsets of behaviors to identify if different behaviors are correlated. Current knowledge of behavioral spillover reveals compelling data for both positive and negative spillover in the pro-environmental domain. In other words, an intervention targeting one environmental behavior has the potential to increase or decrease the motivation to engage in other environmental behaviors. Reasons for positive spillover are attributed to positive environmental feelings and responsibility that span subsequent behaviors, in contrast to negative spillover where partaking in one minimal environmentally friendly behavior justifies further negative environmental behaviors, essentially granting someone "moral license" to behave badly. Specifically, prior studies find that positive spillover occurs as a result of positive environmental attitudes,[i] high perceived control over corresponding behaviors,[ii] and a desire to reinforce one's identity.[iii] This spillover has been documented between recycling and conservation behaviors,[iv] recycling and packaging waste prevention,[v] and recycling, conservation, energy consumption, and car use behaviors.[vi] In contrast, negative spillover occurs when partaking in one environmentally friendly behavior grant someone "moral license" to behave badly or engage in negative environmental behaviors. Diekmann & Preisendörfer argue that people with weaker environmental attitudes perform simple pro-environmental behaviors in order to justify not partaking in other (possibly more significant) pro-environmental behaviors, reinforcing the moral licensing effect.[vii]

Given the focus of prior spillover research has largely been within one domain (e.g., environmental behaviors), it is not known if behavioral spillover occurs between domains, such

as between health and environmental behaviors. Lack of such knowledge is a problem, because not knowing if these trends occur between health and environmental domains limits knowledge of spillover effects in relevant ways. Documenting positive spillover between these two domains opens an opportunity to promote environmental behaviors through health-based interventions.

The long-term goal of this study is to contribute to cross-domain research on spillover effects between health and environmental behaviors. I believe that cross-domain positive spillover will occur because a motivation to engage in one set of behaviors will transcend the other. However, this transcendence is dependent on the initial motivations to engage in these behaviors. Also, I do not believe that negative spillover will occur across these two domains of study because, since they are different domains, I wouldn't expect moral license to be as powerful.

I will attempt to demonstrate the relationship empirically between health and environmental behaviors. Through the development and distribution of a survey, this study will obtain relevant data to examine if engaging in positive health behaviors gives someone a license to partake in harmful actions for the environment, or if these positive behaviors spill over in a positive way to encourage good environmental behavior. The concept of behavioral spillover affects society at large because public health behaviors has been identified as a frame that resonates for most people, so if getting people to engage in healthy behaviors leads to environmental behaviors, this would create positive environmental outcomes. I pose the following two research questions: 1) is there a statistically significant positive relationship between engagement in health behaviors and environmental behaviors? 2) Is the relationship between *easy* behaviors mediated by a *difficult* one? Meaning does a correlation between the two domains depend on engagement in a related difficult behavior? If so, is this relationship

moderated by health/environmental attitudes? In other words, do these relationships only occur when one has strong positive attitudes toward behavior that are health for the self and the environment?

The next section of this proposal reviews and analyzes relevant studies and findings in this area of behavioral spillover to explain how this study adds to those findings and fill a potential gap in the science.

Literature Review

Definition of Behavioral Spillover

Behavioral spillover can be used in a variety of contexts to examine the unique motivating factors that transcend the specific target behavior and indirectly lead to other behaviors. Truelove et al define behavioral spillover as "as an effect of an intervention on subsequent behaviors not targeted by the intervention" (Truelove et al, 2014, p. 128) and they propose a theoretical framework of behavioral spillover which is based on three elements[viii]. Their framework suggests that behavioral spillover can be either negative or positive. Negative spillover occurs when "the successful increase in one pro-environmental behavior (PEB) is associated with a reduction in another PEB" (Truelove et al, 2014, 128). Positive behavioral spillover "occurs when an increase in one PEB is associated with an increase in another PEB" (Truelove et al, 2014, 128).

Decision mode

The first element aimed at explaining the type of spillover that may occur in Truelove's framework is the decision-mode that people use to make their initial pro-environmental behavior (PEB). More specifically, "to the extent that performance of an initial behavior changes the perceived resources the individual has at his or her disposal when evaluating the costs and

benefits of the subsequent behavior, spillover effects can be expected" (Truelove et al, 2014, p. 132). This element of the framework explores the calculative, affect-based and rule-and role-based modes of decision making and how they contribute to spillover. The calculative-based mode of decision making involves "-analytic processing (e.g., the consideration of pros and cons or costs and benefits)" (Truelove et al, 2014, 132). This framework assumes no positive or negative spillover will occur when initial pro-environmental behaviors are performed using the calculative-based mode of decision making. Instead, it is expected that spillover will be averaged out over time. On the other hand, affect-based decisions are representative of a person's feelings towards certain behaviors. They reflect a person's self-image while making decisions. If someone performs a pro-environmental behavior out of guilt or shame; this will decrease their self-image which will lessen the probability of repeated pro-environmental behaviors[ix]. The idea is that affect-based decision making can lead to spillover, but that the valence or direction of the affect determines what type of spillover will occur.

The rule-and role-based mode of decision making "elicits a rule of conduct derived from a social role held by the decision-maker" (Truelove et al, 2014, 132). If someone partakes in a rule- and role-based decision, social norms are elicited due to the presence of group memberships as an activated sense of identity. Therefore, people with strong environmental identity are more likely to experience positive pro-environmental spillover due to the reinforcement of existing environmental identity. They further analyzed that "when people think about goals abstractly, they tend to act consistently with past behavior, whereas thinking about goals in concrete terms results in less behavioral consistency" (Truelove et al, 2014, 133). Abstract reminders of past PEBs more likely results in positive behavioral spillover because "reminding people of abstract moral behaviors leads them to focus on their self-concept, which

activates identity and consistency effects, leading to positive spillover" (Truelove et al, 2014, 133). On the other hand, concrete reminders of PEBs more likely results in negative spillover because it reinforces their completion of supposed environmental responsibility which lessens feelings of guilt in line with the affective decision mode[x].

Causal attribution

Causal attribution is "the post-decision process of attributing a cause for one's action to either an internal or external source" (Truelove et al, 2014, 133). It is the attribution people give for why they chose to perform that behavior. This element mainly focuses on the idea that incentivizing PEBs will "reduce intrinsic motivation, therefore reducing the likelihood of adoption of a subsequent PEB when the external motivator is no longer present" (Truelove et al, 2014, 133), resulting in negative spillover. This element also implies that people desire to be behaviorally consistent which can lead to positive spillover if one PEB which engages environmental identity results in subsequent PEBs in order to remain consistent.

Characteristics of the behaviors

Characteristics of the behavior "include both direct actions (e.g., household energy conservation actions, energy efficient appliance purchases, and volunteering) and behavioral intentions (e.g., expressions of willingness to pay for environmental protection and policy support)" (Truelove et al, 2014, 133). This element classifies PEBs into two dimensions: behavioral difficulty and behavioral similarity. "Difficult behaviors can require monetary investments, significant effort, physical exertion, or foregone comfort or convenience" (Truelove et al, 2014, 134). While people prefer to partake in simple behaviors, they prefer more difficult behaviors for others[xi]. Even if people understand that simple PEBs are not as effective as more difficult behaviors, they are still more inclined to support the simpler behavior[xii]. The

implications of difficult behaviors are that if someone partakes in a difficult PEB they are more inclined to use this difficult behavior to rationalize not partaking in subsequent secondary behaviors. In regard to behavioral similarity, they "predict that positive spillover may be more likely between two similar PEBs, than between dissimilar PEBs, out of a preference for consistency" (Truelove et al, 2014, 134), or a desire to consistently demonstrate one's identity and avoid dissonance. Also, if someone does not a hold pro-environmental identity, behavioral similarity can cause negative spillover if someone performs a PEB to reduce a risk. In attempting to reduce a single risk through behavior, people who do not hold pro-environmental identity will not partake in another pro-environmental behavior to reduce the same risk. Ultimately, behavioral similarity varies based on knowledge and identity; so, someone with high environmental identity and knowledge will be more susceptible to positive behavioral spillover. In Figure 1, this framework is visually represented.

Most of the spillover research focuses on behaviors within the environmental domain-, and does not address if there is spillover across the two domains (e.g., public health and environmental health). Dolan and Galizzi highlight that "there is little evidence on whether spillovers can occur across different domains, and whether such cross-domains spillovers are most likely to be promoting, permitting, or purging"-[xiii]. Identifying if spillover occurs between domains is critical as personal health behaviors and environmental behaviors can be one and the same. For example, someone might choose to buy organic foods to partake in an environmentally friendly behavior and then also exclusively shop locally as a shared motivation with a health

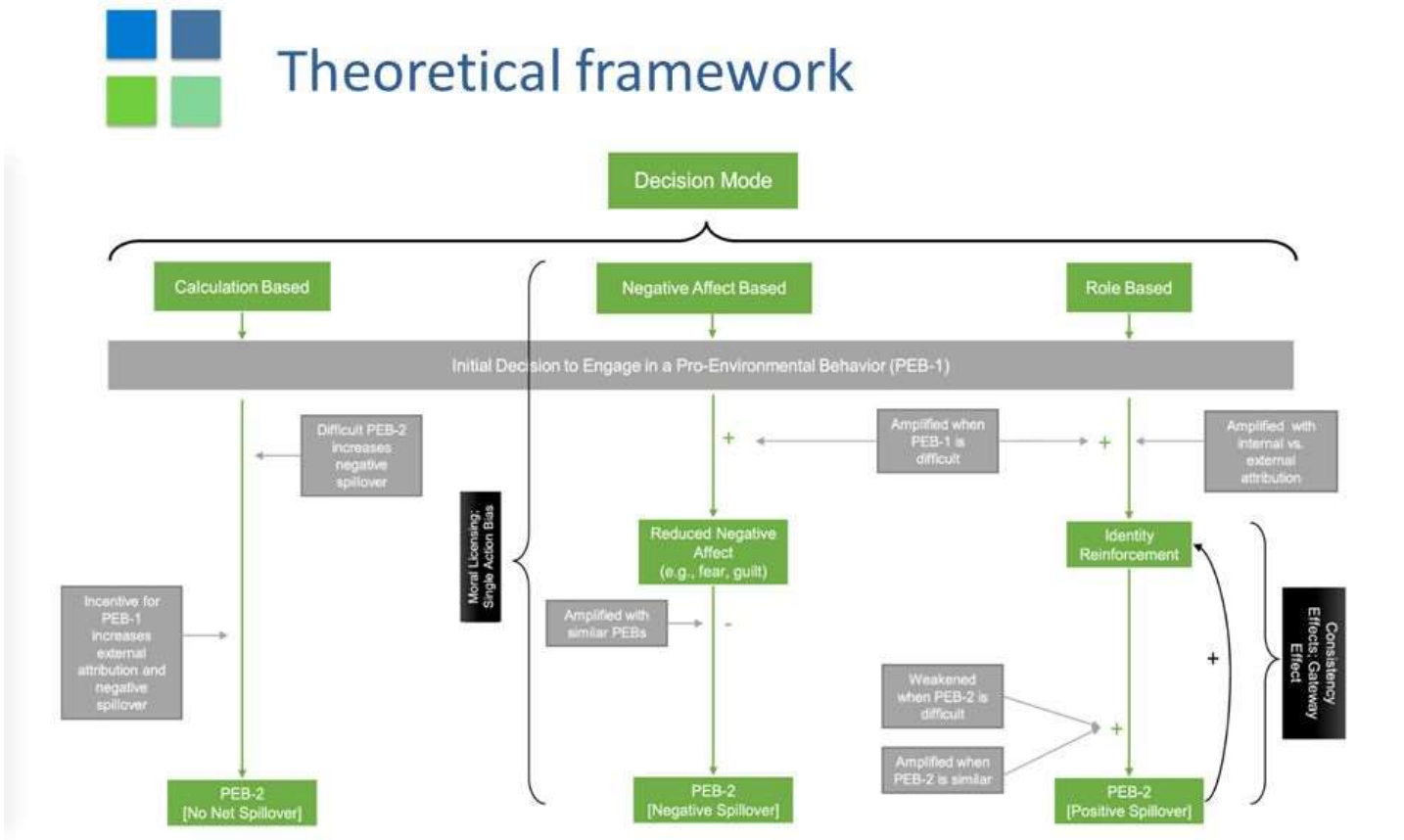
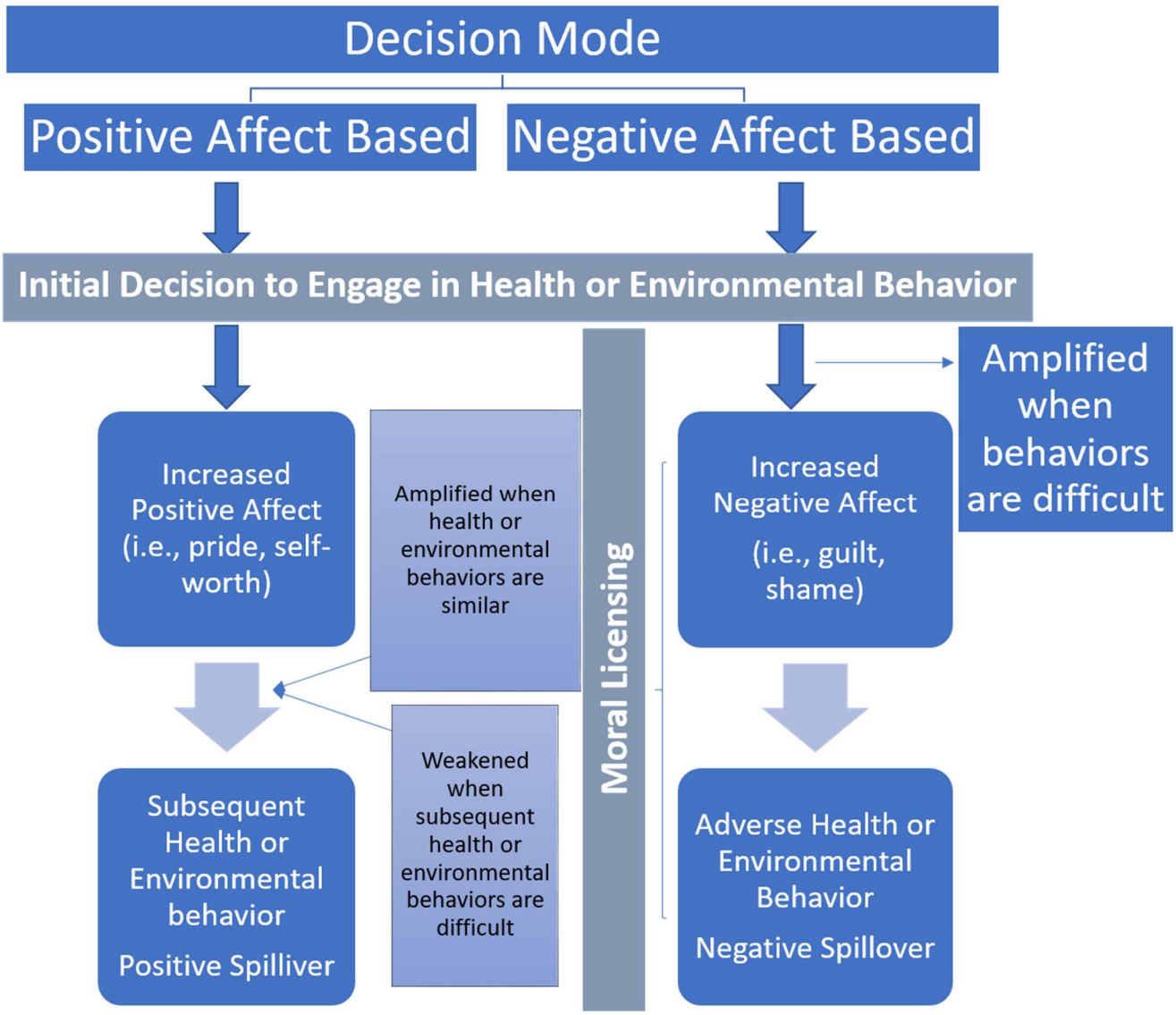


Figure 1: A theoretical framework of behavioral spillover taken from Truelove et al. 2014
Truelove, H., Carrico, A., Weber, E., Raimi, K. T., & Vandenbergh, M. P. (2014). Positive and negative spillover of pro-environmental behavior: An integrative review and theoretical framework. Global Environmental Change: Human and Policy Dimensions, 29, 127-138. doi:10.1016/j.gloenvcha.2014.09.004.

focused behavior. As a result, positive spillover might occur between these domains due to this shared motivation consistent with shared positive attitudes towards the domains. An interesting question in evaluating spillover between two domains is how to motivate a health behavior to promote positive spillover to other health behaviors that also achieve environmental goals? It is necessary for this research study to be conducted because there is a gap in behavioral spillover research as to if there is spillover across two domains of study (e.g., public health and environmental health) as opposed to one.

I have created a model, consistent with Truelove et al,'s framework, which outlines the constituents involved in accurately assessing cross-domain behavioral spillover between health behaviors and environmental behaviors. The model begins with either a positive affect-based decision mode or a negative affect-based decision mode. Both positive and negative affect-based decision modes flow to the initial decision to engage in a health or environmental behavior. From there, the positive affect-based decision mode after the initial decision to engage in a health or environmental behavior flows to increased positive affects (i.e., pride or self-worth). In between this stage and the subsequent health or environmental behavior (positive spillover), is the contingency behavioral difficulty which weakens the likelihood of subsequent health or environmental behaviors and the contingency of behavioral similarity which amplifies the likelihood of subsequent health or environmental behaviors. Under the negative affect-based decision mode, the initial decision to engage in a health or environmental behavior flows to increased negative affects (i.e., guilt or shame). In between these two stages is the contingency of behavioral difficulty, which amplifies negative affect, and flows to the adverse health or environmental behavior (negative spillover). Surrounding the entire negative affect-based decision mode side is moral licensing which occurs in the process of negative spillover.



Methodology

Participants

A survey was administered via email to 800 Ohio State students. 266 participants participated in the survey, resulting in a response rate of 33.25%-, 43 participant results were excluded for lack of completion and missing data. 223 responses were then analyzed through a correlation matrix as well as two regression-based mediation and moderation models. General environmental attitudes[xiv] as well as general health behavior attitudes.[xv] All participants in this

study were volunteers. Participants were recruited from six lists of class rosters, with the consent of the instructor, provided in the People tab of my student class portal (Carmen) account as well as The Environmental and Social Sustainability Research Experience Program. Students from two of the class rosters were also asked to forward the survey to one additional undergraduate student. There was no potential for coercion.

Measures

The following variables were measured through a self-administered multiple-part, 20 item Qualtrics survey.

Independent variables. The survey included four demographic questions which include age, gender, education level, and employment status. The survey also included a section in which the participant will be asked to rank, on a 5-point scale, from strongly disagree to strongly agree their views on statements designed to measure their general environmental-attitude[xvi] as well as a section measuring general health behavior attitudes.[xvii] These measures of one's attitude toward engaging in healthy behaviors and environmental protection was intended to serve as a moderator to determine the causal pathway of spillover measuring the indirect relationship on an easy health behavior, mediated by a difficult environmental/ health behaviors, on an easy environmental behavior. Affect based questions were measured to evaluate feelings of guilt/ shame, pride/joy, etc. to evaluate if there will be significant differences between those with positive environmental/ public health affect versus those without.[xviii] The ease and difficulty of various environmental and health behaviors were also measured through a 5-point Likert scale from strongly disagree to strongly agree with a set of statements.

Dependent variable. Upon evaluation and analysis, dependent variables included measures of engagement in environmental and health behaviors, namely: frequency of recycling (easy) and

cycling as a main mode of transportation (difficult), frequency of regular exercise (easy) and, solely eating a plant based diet (difficult). Originally, sets of scenarios, in accordance with Bratt's methodology were incorporated to measure spillover.[xix] This survey was a Likert scale and participants were asked to select the number along the scale that most closely describes them or their preferences.

Independent and dependent variables were examined through a mediation/moderation model aimed at evaluating: direct relationship between an easy environmental and an easy health behavior; mediated either by the presence of a difficult environmental behavior or a difficult health behavior; incorporating the moderation of health. The figure below represents the pathways assessed in the model: the direct effect of X on Y, the indirect effect of X on Y through the mediator, and the interacting effect of attitudes on the mediated indirect effect.

General	
G1	Biospheric/ Health concern measures
Concern/Emotion	
E1	How concerned are you (if at all) about the environment/ personal health?
E2	When you think about environmental/ health behaviors for a moment, to what extent do you feel guilt/pride?
E3	When you think about environmental/ health behaviors for a moment, to what extent do you feel shame/self-worth?
E4	When you think about X for a moment, to what extent do you feel upset/calm?
E5	When you think about X for a moment, to what extent do you feel bad/good?
Frequency	
F1	Do you participate in these environmental behaviors, if so how often?

F2 Do you participate in these health behaviors, if so how often?

Measured on Likert scale from Strongly disagree- Strongly agree, Not at all important- Extremely important, Always-Never

Design and Procedure

The research design of this study was cross-sectional and correlational as it studied the relationship between environmental and health behaviors resulting in spillover. All participants participated voluntarily in the Qualtrics survey and their responses were anonymous. The survey contained no identifying information. These non-identified responses were analyzed by The Rank-Order Correlation Coefficients Tests to calculate the relationship between the independent and dependent variables. Descriptive statistics included-, mean age of the sample, and the frequencies for employment status, education level, and gender. Independent and dependent variables were examined through a mediation/moderation model aimed at evaluating: the direct relationship between an easy environmental and an easy health behavior; the mediated path through either a difficult environmental behavior or a difficult health behavior; while moderated by general environmental and health attitudes.

Results

Descriptive Statistics of Percentage of Participant Response of Importance of Environmental/ Health Behaviors

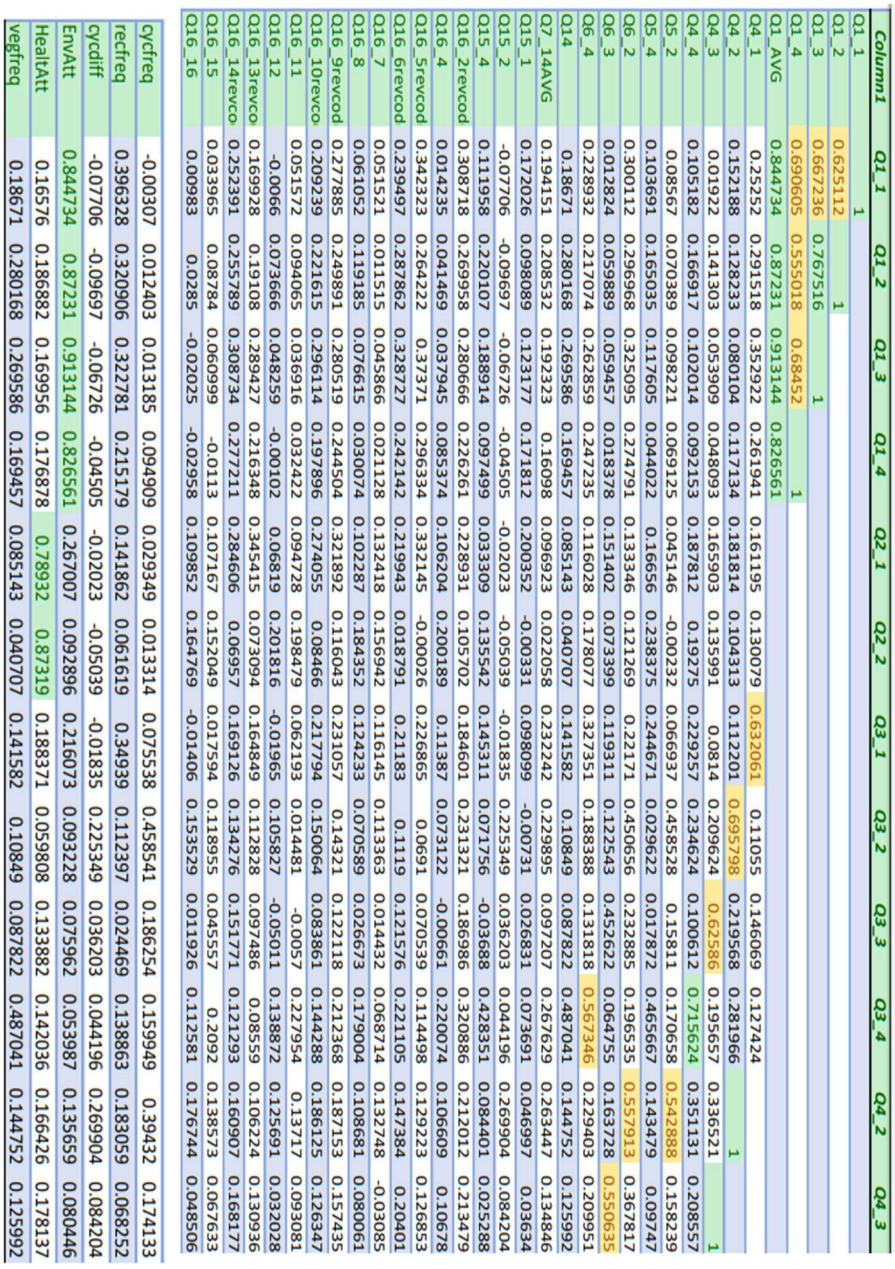
	Exremely Important	**Very Important**	**Moderately Important**	**Slightly Important**	**Not at All Important**
Environmental Behavior	55%	33%	8%	3%	1%
Health Behavior	33%	47%	16%	2%	2%

Participants participated in easy behaviors more frequently than difficult behaviors across the domains, and participated in recycling more frequently than regular exercise. There is a moderately strong relationship (>.5) present between several behaviors, such as: exercising regularly and cycling as a main mode of transportation (between two domains); recycling and cycling as a main mode of transportation (within the environmental domain); and cycling as a main mode of transportation and eating a solely plant-based diet (between the two domains). However, there was no correlation between the two behaviors in the health domain. The correlational data also indicated a positive relationship between environmental/ health attitudes and the frequency of participating in easy health and environmental behaviors. Specifically, as one's attitudes toward the environment become more positive, the frequency of engagement in environmental behaviors increases.

Despite these promising correlational results, there were no significant direct or indirect effects in the mediation and moderation model. Figure 4 demonstrates the pathways of that the model examined. There was no direct effect between the two easy behaviors in both domains (recycling and regular exercise). There was no indirect effect of either easy behavior on the other

through the difficult behavior. There was also no moderating effect of one's attitudes on these relationships.

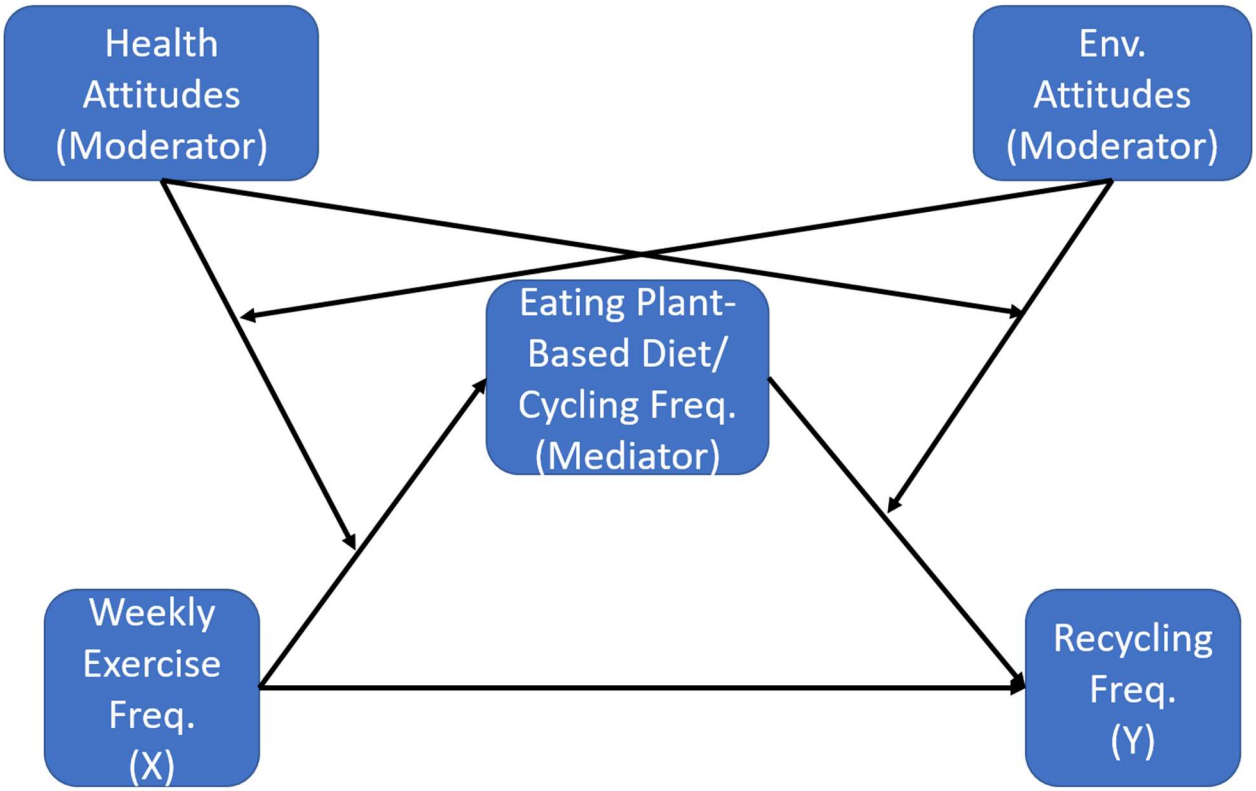
Correlation Matrix



Column1	Q1_1	Q1_2	Q1_3	Q1_4	Q1_AVG	Q4_1	Q4_2	Q4_3	Q4_4	Q5_2	Q5_4	Q6_2	Q6_3	Q6_4	Q14	Q7_14AVG	Q15_1	Q15_2	Q15_4	Q16_2revcod	Q16_4	Q16_5revcod	Q16_6revcod	Q16_7	Q16_8	Q16_9revcod	Q16_10revco	Q16_11	Q16_12	Q16_13revco	Q16_14revco	Q16_15	Q16_16
Q1_1	1																																
Q1_2	0.625112	1																															
Q1_3	0.667236	0.767516	1																														
Q1_4	0.690605	0.555018	0.68452	1																													
Q1_AVG	0.844734	0.87231	0.913144	0.826561	1																												
Q4_1	0.25252	0.291518	0.352922	0.261941	0.161195	0.130079	0.632061	0.11055	0.146069	0.127424																							
Q4_2	0.152188	0.128233	0.080104	0.117134	0.181814	0.104313	0.112201	0.695798	0.219568	0.281966	1																						
Q4_3	0.01922	0.141303	0.053909	0.048093	0.165903	0.135991	0.0814	0.209624	0.62586	0.195657	0.336521	1																					
Q4_4	0.105182	0.166917	0.102014	0.092153	0.187812	0.19275	0.229257	0.234624	0.100612	0.715624	0.351131	0.208557	1																				
Q5_2	0.08567	0.070389	0.098221	0.069125	0.045146	-0.00232	0.066937	0.458528	0.15811	0.170658	0.542888	0.158239	0.208557	1																			
Q5_4	0.103691	0.165035	0.117605	0.044022	0.16656	0.238375	0.244671	0.029622	0.017872	0.465667	0.143479	0.09747	0.158239	0.208557	1																		
Q6_2	0.300112	0.296968	0.325095	0.274791	0.133346	0.121269	0.22171	0.450656	0.232885	0.196535	0.557913	0.367817	0.09747	0.158239	0.208557	1																	
Q6_3	0.012824	0.059889	0.059457	0.018378	0.151402	0.073399	0.119311	0.122543	0.452622	0.064755	0.163728	0.550635	0.209951	0.125992	0.134846	0.03634	1																
Q6_4	0.228932	0.217074	0.262859	0.247235	0.116028	0.178077	0.327351	0.188388	0.131818	0.567346	0.229403	0.209951	0.125992	0.134846	0.03634	1																	
Q14	0.18671	0.280168	0.269586	0.169457	0.085143	0.040707	0.141582	0.10849	0.087822	0.487041	0.144752	0.125992	0.134846	0.03634	1																		
Q7_14AVG	0.194151	0.208532	0.192323	0.16098	0.096923	0.022058	0.232242	0.229895	0.097207	0.267629	0.263447	0.134846	0.03634	1																			
Q15_1	0.172026	0.098089	0.123177	0.171812	0.200352	-0.00331	0.098099	-0.00731	0.026831	0.073691	0.046997	0.03634	1																				
Q15_2	-0.07706	-0.09697	-0.06726	-0.04505	-0.02023	-0.05039	-0.01835	0.225349	0.036203	0.044196	0.269904	0.084204	0.209951	0.125992	0.134846	0.03634	1																
Q15_4	0.111958	0.220107	0.188914	0.097499	0.033309	0.135542	0.145311	0.071756	-0.03688	0.428351	0.084401	0.025288	0.084204	0.209951	0.125992	0.134846	0.03634	1															
Q16_2revcod	0.308718	0.269958	0.280666	0.226261	0.228931	0.105702	0.184601	0.231321	0.186986	0.320886	0.212012	0.213479	0.084204	0.209951	0.125992	0.134846	0.03634	1															
Q16_4	0.014235	0.041469	0.037945	0.085374	0.106204	0.200189	0.11387	0.073122	-0.00661	0.220074	0.106609	0.10678	0.213479	0.084204	0.209951	0.125992	0.134846	0.03634	1														
Q16_5revcod	0.342323	0.264222	0.37371	0.296334	0.332145	-0.00026	0.226865	0.0691	0.070539	0.114498	0.129223	0.126853	0.10678	0.213479	0.084204	0.209951	0.125992	0.134846	0.03634	1													
Q16_6revcod	0.239497	0.287862	0.328727	0.242142	0.219943	0.018791	0.21183	0.1119	0.121576	0.221105	0.147384	0.20401	0.126853	0.10678	0.213479	0.084204	0.209951	0.125992	0.134846	0.03634	1												
Q16_7	0.051521	0.011515	0.045866	0.021128	0.132418	0.156942	0.116145	0.113363	0.014432	0.068714	0.132748	-0.03085	0.20401	0.126853	0.10678	0.213479	0.084204	0.209951	0.125992	0.134846	0.03634	1											
Q16_8	0.061052	0.119185	0.076615	0.030074	0.102287	0.184352	0.124233	0.070589	0.026673	0.179004	0.108681	0.080061	0.147435	0.157435	0.126347	0.093081	0.032028	0.130936	0.168177	0.067633	0.048506	1											
Q16_9revcod	0.277885	0.249891	0.280519	0.244504	0.321892	0.116043	0.231057	0.14321	0.122118	0.212368	0.187153	0.157435	0.126347	0.093081	0.032028	0.130936	0.168177	0.067633	0.048506	0.080061	1												
Q16_10revco	0.209239	0.221615	0.296114	0.197896	0.274055	0.08466	0.217794	0.150064	0.083861	0.144288	0.186125	0.126347	0.093081	0.032028	0.130936	0.168177	0.067633	0.048506	0.080061	0.157435	1												
Q16_11	0.051572	0.094065	0.036916	0.032422	0.094728	0.198479	0.062193	0.014481	-0.0057	0.227954	0.13717	0.093081	0.032028	0.130936	0.168177	0.067633	0.048506	0.080061	0.157435	0.126347	1												
Q16_12	-0.0066	0.073666	0.048259	-0.00102	0.06819	0.201816	-0.01965	0.105827	-0.05011	0.138872	0.125691	0.032028	0.130936	0.168177	0.067633	0.048506	0.080061	0.157435	0.126347	0.093081	0.032028	1											
Q16_13revco	0.169928	0.19108	0.289427	0.216348	0.345415	0.073094	0.164849	0.112828	0.097486	0.08559	0.106224	0.130936	0.168177	0.067633	0.048506	0.080061	0.157435	0.126347	0.093081	0.032028	0.130936	1											
Q16_14revco	0.252391	0.255789	0.308734	0.277211	0.284606	0.06957	0.169126	0.134276	0.151771	0.121293	0.160907	0.168177	0.067633	0.048506	0.080061	0.157435	0.126347	0.093081	0.032028	0.130936	0.168177	0.067633	1										
Q16_15	0.033965	0.08784	0.060999	-0.0113	0.107167	0.152049	0.017594	0.118955	0.045557	0.2092	0.138573	0.067633	0.048506	0.080061	0.157435	0.126347	0.093081	0.032028	0.130936	0.168177	0.067633	0.048506	1										
Q16_16	0.00983	0.0285	-0.02025	-0.02958	0.109852	0.164769	-0.01406	0.153529	0.011926	0.112581	0.176744	0.048506	0.080061	0.157435	0.126347	0.093081	0.032028	0.130936	0.168177	0.067633	0.048506	0.080061	0.157435	1									
cycfreq	-0.00307	0.012403	0.013185	0.094909	0.029349	0.013314	0.075538	0.458541	0.186254	0.159949	0.39432	0.174133	0.125992	0.080446	0.178137	0.125992	0.080446	0.178137	0.125992	0.080446	0.178137	0.125992	0.080446	0.178137	1								
recfreq	0.396328	0.320906	0.322781	0.215179	0.141862	0.061619	0.34939	0.112397	0.024469	0.138863	0.183059	0.068252	0.080446	0.178137	0.125992	0.080446	0.178137	0.125992	0.080446	0.178137	0.125992	0.080446	0.178137	0.125992	0.080446	1							
cycdiff	-0.07706	-0.09697	-0.06726	-0.04505	-0.02023	-0.05039	-0.01835	0.225349	0.036203	0.044196	0.269904	0.084204	0.209951	0.125992	0.134846	0.03634	1																
EnvAtt	0.844734	0.87231	0.913144	0.826561	0.267007	0.092896	0.216073	0.093228	0.075962	0.053987	0.135659	0.080446	0.178137	0.125992	0.080446	0.178137	0.125992	0.080446	0.178137	0.125992	0.080446	0.178137	0.125992	0.080446	0.178137	0.125992	0.080446	1					
HealtAtt	0.16576	0.186882	0.169956	0.176878	0.78932	0.87319	0.188371	0.059808	0.133882	0.142036	0.166426	0.178137	0.125992	0.080446	0.178137	0.125992	0.080446	0.178137	0.125992	0.080446	0.178137	0.125992	0.080446	0.178137	0.125992	0.080446	0.178137	0.125992	1				
vegfreq	0.18671	0.280168	0.269586	0.169457	0.085143	0.040707	0.141582	0.10849	0.087822	0.487041	0.144752	0.125992	0.080446	0.178137	0.125992	0.080446	0.178137	0.125992	0.080446	0.178137	0.125992	0.080446	0.178137	0.125992	0.080446	0.178137	0.125992	0.080446	0.178137	0.125992	0.080446	0.178137	1

Q4_4	Q5_4	Q6_4	Q8	Q10	Q14	Q7_14AVG	Q15_2	Q15_4	Q16_1revcode	Q16_2revcode
1										
0.161751										
0.55412	1									
0.272434	0.163374									
0.122463	0.034226									
0.67164	0.54366	1								
0.531599	0.426024	0.504008	0.206534	0.218369	1					
0.271412	0.208143	0.277821	0.552118	0.584601	0.730802	1				
0.0867	0.032321	0.087735	0.436123	-0.02851	0.116549	0.232738619				
0.047844	0.059906	-0.01162	0.002502	0.524745	0.046052	0.213771446	1			
0.443674	0.389282	0.406153	0.177823	0.063216	0.576682	0.309550029	0.083326	1		
0.343751	0.260385	0.343694	0.279746	0.151049	0.316429	0.25934924	0.102023	0.183588	0.732784778	1
0.275336	0.265799	0.239898	0.038509	0.09367	0.236319	0.115028985	0.01816	0.118407	-0.040598918	0.068680433
0.14248	0.195747	0.205991	0.302188	0.015991	0.161172	0.214835576	0.026247	0.045275	0.573659564	0.56007435
0.214186	0.256239	0.224664	0.290574	0.079452	0.251442	0.261853439	0.053681	0.184191	0.617865231	0.713992268
0.140844	0.154101	0.09704	0.113531	0.008643	0.060737	0.085922837	0.000132	0.124864	-0.071265349	-0.0265324
0.297041	0.250793	0.29703	0.114841	0.056995	0.241801	0.181896734	0.006809	0.218006	-0.109886926	0.054542733
0.256314	0.188548	0.210939	0.245356	0.090139	0.245215	0.20429552	0.013893	0.174444	0.565729964	0.588515088
0.147536	0.097876	0.159701	0.237757	0.093971	0.165203	0.174491574	0.049429	0.020406	0.619500988	0.544492744
0.382521	0.27126	0.302139	0.053144	0.067329	0.299869	0.171281924	0.129294	0.206458	-0.065429383	0.057728768
0.229648	0.114035	0.129981	0.040539	0.193798	0.206626	0.151889882	0.17058	0.169113	-0.029329025	0.054855949
0.111631	0.032945	0.065946	0.140628	0.03418	0.135487	0.135116277	-0.04208	0.032316	0.518979374	0.487654448
0.168514	0.022539	0.11719	0.170813	0.025217	0.211213	0.152496488	-0.02031	0.050976	0.588713436	0.572962627
0.273613	0.188928	0.134162	0.070145	0.1663	0.190247	0.168258303	0.086682	0.113438	-0.073151766	-0.009612797
0.18268	0.116272	0.033178	0.012551	0.160667	0.109093	0.08305292	0.055757	0.073911	-0.058365031	-0.008218408
0.081071	0.014976	0.04394	0.069378	1	0.218369	0.584600648	0.524745	0.063216	0.138560496	0.151048805
0.175782	0.106842	0.209894	1	0.069378	0.206534	0.552117543	0.002502	0.177823	0.172354771	0.279746268
0.047844	0.059906	-0.01162	0.002502	0.524745	0.046052	0.213771446	1	0.083326	0.121545466	0.102022845
0.136783	0.130323	0.275517	0.362382	0.030621	0.263413	0.21872612	-0.08407	0.185617	0.32651692	0.313184982
0.22831	0.248032	0.180715	0.116158	0.024458	0.072598	0.066007928	-0.04447	0.10853	0.231462257	0.190998802
0.531599	0.426024	0.504008	0.206534	0.218369	1	0.730802065	0.046052	0.576682	0.231940979	0.316429438

Q16_3	Q16_4	Q16_5revcode	Q16_6revcode	Q16_7	Q16_8	Q16_9revcode	Q16_10revcode	Q16_11	Q16_12	Q16_13revcode	Q16_15	cyclfreq
0.77381	1											
-0.12905	-0.12762	1										
-0.09792	-0.06924	0.676946387	1									
0.424233	0.376289	0.053541825	-0.056465634	1								
0.660827	0.750579	-0.081453887	-0.046866379	0.468349	1							
-0.10209	-0.03095	0.553659252	0.639114828	-0.18906	0.070545	1						
-0.12974	-0.15229	0.606611177	0.666529677	-0.16316	-0.11108	0.74363921	1					
0.575366	0.674157	-0.13041209	-0.023249516	0.379588	0.802423	0.049456783	-0.110637697	1				
0.694109	0.652177	-0.120097242	-0.059919038	0.453848	0.720361	-0.020032232	-0.096709733	0.6935438	1			
-0.12559	-0.10221	0.545404938	0.56847291	-0.03486	-0.06551	0.625323043	0.692862515	-0.095482	-0.046302	1		
-0.13226	-0.18908	0.580755249	0.65396153	-0.14627	-0.14957	0.690581171	0.740757756	-0.100646	-0.093001	0.732147762	1	
0.54085	0.519852	-0.020276042	-0.085908377	0.637963	0.595715	-0.080507997	-0.100387809	0.6282351	0.5957791	-0.071681447	1	1
0.674959	0.648762	-0.112095292	-0.135809527	0.582787	0.631884	-0.092382927	-0.150052889	0.6054933	0.7015431	-0.10582969	0.7321217	
0.121761	0.09367	0.01599123	0.079451621	0.008643	0.056995	0.090138539	0.093970844	0.0673286	0.1937985	0.034180344	0.1663002	1
-0.01194	0.038509	0.302188148	0.290573528	0.113531	0.114841	0.245355631	0.237757472	0.0531443	0.0405395	0.140628262	0.0701446	0.0693779
0.113675	0.01816	0.026246508	0.053681122	0.000132	0.006809	0.013892701	0.049428509	0.1292943	0.1705796	-0.042081511	0.0866824	0.5247453
-0.00041	0.050032	0.367457881	0.321404271	0.037202	0.08688	0.303018228	0.269909317	0.0640493	0.0380488	0.25248643	0.0544606	0.0306211
0.161892	0.189999	0.173776015	0.128043113	0.174897	0.17757	0.246967131	0.200448874	0.1831025	0.1714502	0.230003426	0.1583656	0.0244576
0.0913	0.236319	0.161172111	0.2514422	0.060737	0.241801	0.245214929	0.165203359	0.2998694	0.206626	0.135486747	0.1902472	0.2183695



Conclusions

Although there were no significant relationships within the model, correlational data and descriptive statistics provide a basis for future research. This study finds positive correlations between these two domains of behavior not previously examined. The causal pathways between the two should be further examined because individual health frames resonate for most people as a reason to act to address environmental issues. If we could better capture the affective motivation behind engaging in an easy health behavior, we may be able to assess whether this motivation carries over to similarly easy environmental behaviors with health outcomes. Future research should document ways to establish this positive spillover between health and environmental behaviors. Specifically, finding out ways to increase pro-environmental behaviors

by promoting health behaviors, which could, more generally, result in increasing- positive, collective environmental outcomes in addition to personal health outcomes. Future research would be more successful in participating in a behavioral spillover experiment rather than a survey, which *could* be evaluated within our constructed model where causal pathways are implied. With this current data it is difficult to truly assess the concept of spillover, which occurs over time.

Although there were no significant results within the interpreted model evaluating causal pathways resulting in spillover, interesting correlational data provides implications for future research. It is difficult to quantify behavioral spillover by a survey measure, so, if an experiment were to be conducted, we believe that these correlations would be further proved. It would also be interesting to study the concept of moral licensing regarding participant responses to environmental and health behavior attitudes.

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Appendix

Q1 To begin, please rate the following statements from not at all important to extremely important.

	Not at all important (1)	Slightly important (2)	Moderately important (3)	Very important (4)	Extremely important (5)
Preventing pollution, conserving natural resources (1)	○	○	○	○	○
Unity with nature, fitting into nature (2)	○	○	○	○	○
Respecting the earth, harmony with other species (3)	○	○	○	○	○
Protecting the environment, preserving nature (4)	○	○	○	○	○

Q2 Now, rate these following statements from strongly disagree to strongly agree.

	Strongly disagree (1)	Somewhat disagree (2)	Neither agree nor disagree (3)	Somewhat agree (4)	Strongly agree (5)
I think about my health a lot. (5)	○	○	○	○	○
I am concerned about my health. (2)	○	○	○	○	○
I think that it is not important that people take special care of their health. (3)	○	○	○	○	○

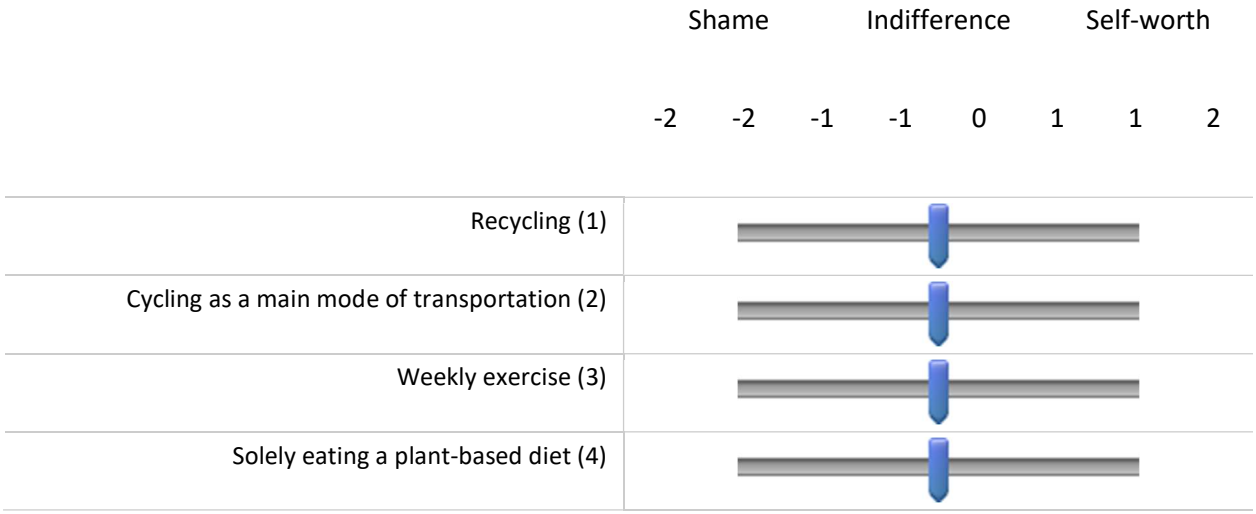
End of Block: Block 1

Start of Block: Block 2

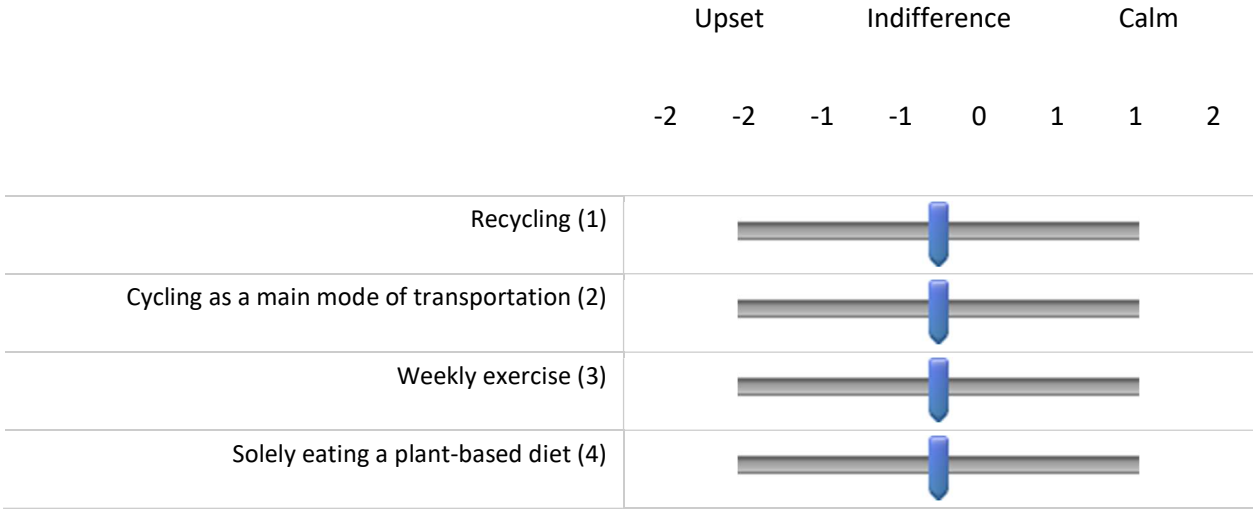
Q3 Now, rate how you feel when you think about engaging or not engaging in each of these behaviors. You will pick a rating from guilt to pride where -2 represents a lot of guilt, -1 represents a little guilt, 0 represents neither guilt nor pride, 1 represents a little pride and 2 represents a lot of pride.

	Guilt			Indifference			Pride	
	-2	-2	-1	-1	0	1	1	2
Recycling (1)								
Cycling as a main mode of transportation (2)								
Weekly exercise (3)								
Solely eating a plant-based diet (4)								

Q4 Similar to the previous questions, now rate how you feel when you think about engaging or not engaging in those same behaviors on a scale from shame to positive self-worth.



Q5 Now rate how you feel when you think about engaging or not engaging in those same behaviors on a scale from upset to calm.



Q6 Finally, rate how you feel generally when thinking about engaging or not engaging in these behaviors on a scale from bad to good.

	Bad			Indifference			Good	
	-2	-2	-1	-1	0	1	1	2
Recycling (1)								
Cycling as a main mode of transportation (2)								
Weekly exercise (3)								
Solely eating a plant-based diet (4)								

End of Block: Block 2

Start of Block: Block 3

Q7 Do you recycle?

- Yes (1)
- No (2)

Q8 If yes, how often?

- Always (5)
- Very often (4)
- Sometimes (3)
- Rarely (2)
- Never (1)

Q9 Do you cycle as a main mode of transportation?

- Yes (1)
- No (2)

Q10 If yes, how often?

- Always (5)
- Very often (4)
- Sometimes (3)
- Rarely (2)
- Never (1)

Q11 Do you exercise weekly?

- Yes (1)
- No (2)

Q12 If yes, how often?

- Always (5)
- Very often (2)
- Sometimes (3)
- Rarely (2)
- Never (5)

Q13 Do you eat a solely plant-based diet?

- Yes (1)
- No (2)

Q14 If yes, how often?

- ○ Always (5)
- ○ Very often (4)
- ○ Sometimes (3)
- ○ Rarely (4)
- ○ Never (1)

End of Block: Block 3

Start of Block: Block 4

Q15 When you think about engaging in each of these activities, how hard is it to engage in each one? Please rate each behavior on a scale from extremely easy to extremely difficult.

	Extremely easy (5)	Somewhat easy (4)	Neither easy nor difficult (3)	Somewhat difficult (2)	Extremely difficult (1)
Recycling (1)	○	○	○	○	○
Cycling as a main mode of transportation (2)	○	○	○	○	○
Weekly exercise (3)	○	○	○	○	○
Solely eating a plant-based diet (4)	○	○	○	○	○

Q16 From strongly disagree to strongly agree, rate these following statements.

	Strongly disagree (1)	Somewhat disagree (2)	Neither agree nor disagree (3)	Somewhat agree (4)	Strongly agree (5)
If one recycles, then it does not matter that much if he/she cycles as a main mode of transportation. (1)	○	○	○	○	○
If one recycles, then it does not matter that much if he/she solely eats a plant-based diet. (2)	○	○	○	○	○
If one recycles, then he/she should cycle as a main mode of transportation. (3)	○	○	○	○	○
If one recycles, then he/she should solely eat a plant-based diet. (4)	○	○	○	○	○
If one cycles as a main mode of transportation, then it does not matter that much if he/she recycles. (5)	○	○	○	○	○
If one cycles as a main mode of transportation, then it does not matter that much if he/she solely eats a plant-based diet. (6)	○	○	○	○	○

If one cycles as a main mode of transportation, then he/she should recycle. (7)	○	○	○	○	○
If one cycles as a main mode of transportation, then he/she should solely eat a plant-based diet. (8)	○	○	○	○	○
If one exercises weekly, then it does not matter that much if he/she solely eats a plant-based diet. (9)	○	○	○	○	○
If one exercises weekly, then it does not matter that much if he/she cycles as a main mode of transportation. (10)	○	○	○	○	○
If one exercises weekly, then he/she should solely eat a plant-based diet. (11)	○	○	○	○	○
If one exercises weekly, then he/she should cycle as a main mode of transportation. (12)	○	○	○	○	○

If one solely eats a plant-based diet, then it does not matter that much if he/she exercises weekly. (13)	○	○	○	○	○
If one solely eats a plant-based diet, then it does not matter that much if he/she cycles as a main mode of transportation. (14)	○	○	○	○	○
If one solely eats a plant-based diet, then he/she should exercise weekly. (15)	○	○	○	○	○
If one solely eats a plant-based diet, then he/she should cycle as a main mode of transportation. (16)	○	○	○	○	○

End of Block: Block 4

Start of Block: Block 5

Q17 What is your gender?

- Male (1)
- Female (2)
- Choose not to answer (3)

Q18 What is your age?

0 10 20 30 40 50 60 70 80 90 100

Slide for age (1)

Q19 What is your level of education?

- First year of college (1)
- Second year of college (2)
- Third year of college (3)
- Fourth year of college (4)
- Fifth year of college (5)
- Other (98) _____

Q20 What is your employment status?

- ○ Part-time employment (1)
- ○ Full-time employment (2)
- ○ Not currently employed (3)

Q33 Have you taken this survey for another class?

- ○ Yes (1)
- ○ No (2)

End of Block: Block 5

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